

## **Case Study: Ground Source Heat Pump in an Historic Home**

- Location: Old Town Alexandria at 510 Hammonds Court (formerly 204 North Pitt Street)
- Building Type: Single-Family Residential
- Project Type: Adaptive Reuse, Renovation and Addition to an historic building incorporating a renewable energy source
- Historic Construction: 1850's Carriage House

When developer Bill Cromley purchased this historic carriage house, unique in that it was not built to accommodate a house but rather to house horses that delivered ice, it was abandoned and unusable. Although long ago converted into small garage stalls, it had no modern use as a carriage house since horses are not allowed on the street in Old Town Alexandria. After working with the City of Alexandria, Cromley was given permission to build an addition to the carriage house and modernize it into an energy-efficient 3 bedroom, 3 ½ bath home. The original structure was less than 1,000 square feet, so after the addition of a basement and two stories above it, the carriage house is now approximately 2,000 square feet.

Although located in the very densely populated area of Old Town Alexandria in an alleyway, the developer was able to incorporate a ground source heat pump for the new residents. By drilling two 300-foot wells in the alley, Cromley was able to install a 48,000 BTU ground source heat pump system, which furthermore contributes to hot water heating during the summer months. Because it draws both heat and cooling from the earth, which is at a constant temperature, ground source heating and cooling is highly efficient with about an 85-90% transfer of heat. The initial cost of this system can be much higher than a traditional heat pump, however the monthly costs can be less than 1/5 of the average cost for a house with the same square footage. Because current owners Joan and Jack Dempsey contracted to buy the carriage house from the developer about half-way through the renovation and addition, they were able to take advantage of the Federal tax credit of 30% of the cost for the ground source heat pump.

As there were no existing windows in the original carriage house, Cromley was allowed to install low-e, double-pane, argon-filled windows, in addition to adding much more insulation than was required by code. Combined with Energy Star appliances and many other sustainable building materials, this carriage house is a great example of the “greening” of an historic home.



Figure 1 - Before



Figure 2 - After

